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ABSTRACT

A study identified and verified the technical competencies needed by Tennessee high school teachers of vocational horticulture in the areas of greenhouse management and landscape design. From an initial list of competencies that was developed and refined, a survey instrument was constructed. The instrument contained 108 competencies in greenhouse management and 31 competencies in landscape design. The 35 teachers questioned responded on a five-point Likert scale for each competency. All 108 competencies in greenhouse management received mean ratings of 3.00 or higher; 45 received mean ratings of 4.00 or higher. All 31 competencies in landscape design received mean ratings of 3.00 or higher; 18 received mean ratings of 4.00 or higher. It was recommended that the competencies be incorporated into agricultural education and horticulture programs at Tennessee Technological University. Findings should be used in design and development of inservice teacher training programs. Techniques should be developed to measure undergraduate student performance of the competencies. (Two tables list the competencies and their mean scores. The survey instrument is appended.) (YLB)

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TECHNICAL COMPETENCIES IN GREENHOUSE MANAGEMENT AND LANDSCAPE DESIGN NEEDED BY HIGH-SCHOOL TEACHERS OF VOCATIONAL HORTICULTURE IN TENNESSEE

by

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The author gratefully acknowledges the technical assistance of Mr. Harold Funk, Associate Professor of Horticulture at Tennessee Technological University, in developing the survey instrument.

The author also wishes to express special appreciation to the 35 high school teachers of vocational horticulture in Tennessee for their time and effort in responding to the survey instrument used in the study.

INTRODUCTION

Agriculture is one of the most dynamic industries in the American economy. Ornamental horticulture is emerging as a rapidly growing agricultural area. Horticulture jobs are expanding in rural as well as in urban communities. As part of vocational agriculture, administrators, teachers, and students have worked diligently to keep pace with ornamental horticulture changes, technology, and plant growth practices. Therefore, ornamental horticulture is becoming an important part of vocational agricultural education.

For many years, teachers of vocational horticulture in Tennessee did most of the "work" in the teaching-learning process. Teachers were burdened with the bulk of responsibility in selecting and organizing instructional experiences. However, in 1981, under a contract with the University of Tennessee at Knoxville, the State Department of Education developed a Competency Based Ornamental Horticulture Curriculum for Tennessee. The curriculum provides knowledge, skills, and learning experiences related to many jobs in the ornamental horticulture industry.

The modern competency based curriculum for ornamental horticulture in Tennessee neccessitates constant attention to both professional and technical improvement. It is impossible for students to become adequately proficient in performing all the diverse competencies needed by teachers of vocational horticulture in their pre-service preparation. Successful teachers of horticulture must constantly expand and improve their competencies through professional and technical in-service activities.

PURPOSE OF THE STUDY

The purpose of this study was to identify and verify the technical competencies needed by high-school teachers of vocational horticulture in Tennessee in the areas of greenhouse management and landscape design. This study provided information that faciliated the redirection of the professional and technical programs in agricultural education and in ornamental horticulture at Tennessee Technological University.

RESEARCH PROCEDURE

The review of literature revealed the potential for improving both pre-service and in-service teacher education programs by the use of a competency-based format. Several institutions have identified the professional competencies for vocational educators in general and a few institutions have identified professional and technical competencies needed by teachers of agriculture. The basis for this study was to identify the technical competencies in greenhouse management and landscape design needed by vocational horticulture teachers in Tennessee. An initial list of technical competencies in greenhouse management and landscape design potentially needed by high-school vocational horticulture teachers was developed in January, 1983. The source used to develop the list was the Tennessee Ornamental Horticulture Competency Based Curriculum published in 1981 by the State Department of Education, Division of Vocational-Technical Education. The initial list of competencies was refined by Mr. Harold Funk, Associate Professor of Horticulture at Tennessee Technological University.

A survey instrument was constructed from the list of competencies. The instrument contained 108 competencies in greenhouse management and 31 competencies in landscape design. With each competency there was a five-point Likert scale. A rating of five (5) was considered a high need for the competency; likewise, a rating of one (1) was considered a low need for the competency. Respondents were asked to check the appropriate response for each competency.

The population for this study consisted of all teachers of vocational horticulture in Tennessee in 1982-83. The survey instrument, a cover letter explaining the purpose of the study and a self-addressed stamped envelope were mailed to the 80 teachers on February 25, 1983. A follow-up letter was sent to the teachers who had not responded on April 4, 1983. (A copy of the survey instrument, cover letter, and follow-up letter are in the appendix.) Thirty-five teachers (43.7 percent) completed and returned the survey instrument.

To analyze data pertaining to the purpose, measures of central tendency (mean) were determined for the competency level needed by the teachers of vocational horticulture.

OPERATIONAL DEFINITIONS

Competence - the degree or level of competency possessed by an individual.

Competency - behavioral characteristics of knowledge, skills, attitudes, and judgement generally required for the successful performance of a task.

Competency - based teacher education - a system of teacher education which has as its specific purpose the development of specifically described knowledge, skills, and behaviors that will enable a teacher to meet performance criteria for classroom teaching.

In-service education - those organized learning experience for teachers which promote their professional and technical competencies in agricultural education.

Ornamental horticulture - the art, science, and business invalued in the commercial production, marketing, and use of floral crops, garden flowers, evergreens and deciduous shrubs and trees. The five areas of ornamental horticulture are (1) floriculture, (2) greenhouse management, (3) landscaping, (4) nursery management, and (5) turf management.

Pre-service education - those organized learning experiences for prospective instructors which prepare them for future employment as teachers of vocational horticulture.

Technical competency - a knowledge, skill, or attitude a teacher must possess to adequately executive his/her job as a teacher. In this study the areas of technical competencies studied were: (1) greenhouse management, and (2) landscape design.

PRESENTATION AND ANALYSIS OF DATA

This section presents the data that identifies the technical competencies needed in greenhouse management and landscape design by the teachers of vocational horticulture in Tennessee. The competency statements were responded to on a five-point scale with a rating of five (5) considered a high need for the competency; likewise, a rating of one (1) was considered a low need for the competency. Mean responses were determined for each competency statement of the survey instrument. The results are presented in Tables 1 and 2.

The means for technical competencies needed in greenhouse management by the teachers of horticulture are reported in Table 1. The means for the 108 competencies needed by the teachers ranged from 3.11 to 4.62. Sixty-three competencies received mean schores between 3.11 and 3.99, and forty-five competencies betwwen 4.00 and 4.62. The ten competencies

Table 1. Mean Scores of Technical Competencies in Greenhouse Management Needed by Teachers of Vocational Horticulture in Tennessee, 1983.

Competencies	Mean Scores[a] Needed by Teachers N=35
1. Identify potential safety hazards in a greenhouse.	4.47
2. Determine methods of eliminating safety hazards in a greenhouse.	4.41
3. Identify common houseplants.	4.62
4. Identify common greenhouse plants.	4.46
5. Identify correct soil mix for common types of crops.	4.15
6. Name steps in preparing a compost pile.	3.11
7. Demonstrate correct procedure in mixing soil.	3.83
8. Demonstrate correct procedure in filling bins, benches, and pots.	3.71
9. Prepare production schedules for common bedding plants.	4.37
10. Prepare production schedules for common annual flowers.	4.34
11. Identify the light and temperature requirements for common houseplants.	3.94
12. Identify the soil requirements for common houseplants.	3.72
13. Identify class of poinsettias and examples of each class.	3.29
14. Describe and diagram types and arrangements of inflorescence on a blooming poinsettia.	3.20
15. Identify and describe basic needs of growing poinsettias.	3.73
16. Determine types of fertilizer needed by poinsettias	3.38

Table 1 Continued

	Competencies	Mean Scores[a] Needed by Teachers N=35
17.	Calculate rates of fertilizer needed by poinsettias.	3.80
18.	Compare advantages and disadvantages of methods in controlling the height of poinsettias.	3.51
19.	Determine photo-period and time requirements for poinsettias.	3.78
20.	Identify common diseases and insects attacking poinsettias.	3.88
21.	Methods of controlling common diseases and insects on poinsettias.	3.91
22.	Name, identify, and describe classes of chrysanthemums.	3.43
23.	Determine photo-period and time requirements for chrysanthemums.	3.57
24.	List propagation techniques and potting instructions for chrysanthemums.	3.56
25.	Identify correct light and temperature requirements for chrysanthemums.	3.57
26.	Determine correct water requirements for chrysanthemums.	3.43
27.	Determine correct fertilizer requirements for chrysanthemums.	3.60
28.	Describe why disbudding and pinching are important to chrysanthemum production.	3.69
29.	Describe why growth regulators are important to chrysanthemum production.	3.66
30.	Demonstrate correct method for moving plants from beds to plots.	3.86
31.	Select good stock plants for cuttings and seedlings.	3.94
32.	Demonstrate correct procedures of thinning, pruning, typing, and disbudding plants.	3.91
33.	Demonstrate correct procedure for watering plants.	4.26

Table 1 Continued

	Competencies	Mean Scores[a] Needed by Teachers N=35
34.	Prepare a complete production schedule for a greenhouse crop.	4.22
35.	Determine correct ventilation requirements for the greenhouse.	4.03
36.	Compare heating methods for a greenhouse.	3.86
37.	Determine heating requirements and annual fuel costs for various size greenhouses.	3.66
38.	Compare methods of cooling a greenhouse.	3.69
39.	Identify deficiency symptoms of the essential chemical elements.	4.26
40.	Describe influence of each of the essential chemical elements on plant growth.	4.31
41.	Determine types of fertilizers to use and when to apply on various plants.	4.14
42.	Determine kinds and rates of fertilizer and lime to apply on various plants.	4.31
43.	Calculate rates of liquid plant food to apply on various plants.	4.14
44.	Select proper applicators to use with liquid fertilizers.	3.89
45.	Identify common greenhouse insects.	4.35
46.	Identify major body parts and life cycle stages of insects.	3.57
47.	Identify common greenhouse insects and the damage that each does.	4.14
48.	Identify common organisms and name the diseases they cause on greenhouse plants.	4.11
49.	Describe disease damage to plants caused by common organisms.	4.11
50.	Identify ways diseases are spread to plants.	4.08
51.	Describe the effects of light, temperature, and humidity on plant diseases.	4.19

Table 1 Continued

	Competencies	Mean Scores[a] Needed by Teachers N=35
52.	Identify means used in controlling commmon greenhouse diseases.	4.28
53.	Name and interpret all information found on a pesticide lable.	4.43
54.	Identify common weeds that may be growing among greenhouse plants.	3.76
55.	Determine influence of weeds on plant growth and sale value.	3.62
56.	Select a method of controlling weeds that are growing in the greenhouse crops.	3.79
57.	Identify correct stage which greenhouse plants should be harvested.	4.14
58.	Identify grades and quality of plants according to standards.	3.86
59.	Correctly demonstrate procedure for packaging and labeling greenhouse plants.	3.61
60.	Identify and remove dead and diseased blooms and leaves on plants in storage.	3.63
61.	Identify proper storage conditions for flowers and materials that may be used to prolong life.	3.51
62.	Determine proper method and materials to use in packing flowers and rotating stock.	3.26
63.	Define common greenhouse terms accurately.	4.00
64.	Identify types of greenhouse shapes.	3.60
65.	Define common greenhouse parts accurately.	3.45
66.	List advantages and disadvantages of various greenhouse building materials.	3.80
67.	List desirable characteristics of good greenhouse benches.	3.57
68.	Identify and state advantages of various greenhouse bench arrangements.	3.40
69.	Define common plant propagation terms.	4.11

Table 1 Continued

	Competencies	Mean Scores[a] Needed by Teachers N=35
70.	State reasons for sexual and asexual reproduction in propagating various kinds of plants.	4.26
71.	Identify sexual organs and processess of reproduction in a complete plant flower.	3.91
72.	Identify parts and processes in propagating plants sexually.	3.97
73.	Identify parts and processes in propagating plans asexually.	4.02
74.	Identify types and characteristics of various plant growing media.	3.86
75.	List requirements of media used for transplanting seedlings.	4.14
76.	List requirements of media used for transplanting asexually propagated materials.	4.11
77.	Mix ingredients for a soil mix according to specifications.	4.08
78.	Identify purposes for sterilizing soil.	4.08
79.	Identify methods of sterilizing soil.	3.91
80.	Identify the procedures in sterilizing soil.	3.91
81.	Describe environmental needs of newly propagated plant materials.	4.08
82.	Compare types of propagating structures and equipment items.	3.60
83.	Label propagated materials correctly.	3.88
84.	Differentiate between the common types of cuttings from woody plants.	3.83
85.	Identify tools, equipment, and materials needed for proper handling of cuttings.	3.94
86.	Demonstrate proper methods for taking cuttings from woody plants.	4.00
87.	Identify parts of a herbaceous plant used in making cuttings.	4.18

Table 1 Continued

	Competencies	Mean Scores[a] Needed by Teachers N=35
88.	Make common types of cuttings from a herbaceous plant correctly.	4.14
89.	Define term "plant layering" correctly.	3.91
90.	Identify common types of layerage that can be used in propagating plants.	3.94
91.	Demonstrate correct time and procedures for propagating plants by layerage	3.80
92.	Define separation, division, and offset in propagating plants.	3.97
93.	Identify specialized organs by which plants reproduce asexually.	3.62
94.	Separate plants correctly for propagating.	3.94
95.	Define terms related to grafting and budding.	4.00
96.	Explain uses for propagating when grafting or budding.	4.00
97.	Explain process involved in making the union on a completed graft.	4.03
98.	Demonstrate types of grafts.	4.00
99.	Demonstrate budding procedures.	4.00
100.	List practices to insure a successful graft.	4.03
101.	Identify different vegetable seeds.	3.77
102.	Identify different flower seeds.	3.68
103.	List reliable sources of seeds, when buying.	3.91
104.	List factors affecting dormancy and methods of breaking dormancy of seeds.	3.97
105.	Name methods of testing seeds.	3.53
106.	Prepare, plant, and care for seed flats.	4.37
107.	Prepare, plant, and care for seedlings.	4.44
108.	List steps when transplanting seedlings.	4.35

[a]Ratings based on a five-point scale.

receiving the highest mean scores were "identify common houseplants" (item 3); "identify potential safety hazards in a greenhouse" (item 1); "identify common greenhouse plants" (item 4); "prepare, plant, and care for seedlings" (item 107); "name and interpret all information found on a pesticide label" (item 53); "determine methods of eliminating safety hazards in a greenhouse" (item 2); "prepare production schedules for common bedding plants" (item 9); "prepare, plant, and care for seed flats" (item 106); "identify common greenhouse insects" (item 45); and "list steps when transplanting seedlings" (item 108).

Table 2 shows the mean scores for the 31 technical competencies related to landscape design. The means for the competencies needed by the teachers ranged from 3.74 to 4.49. Thirteen competencies received means between 3.74 and 3.99, and eighteen competencies between 4.00 and 4.49. The six competencies with the highest mean scores were "identify trees, shrubs, and ground covers suitable for landscaping in areas to be planted" (item 16), "list ways that landscaping would increase property value" (item 6); "plant trees, shrubs, bulbs, and ground cover according to a landscape construction and maintenance plan" (item 27); list reasons for landscaping property" (item 1); "identify plant conditions that would prevent soil erosion in landscaping" (item 5) and "identify terms related to weeds and herbicides" (item 10).

Table 2. Mean Scores of Technical Competencies in Landscape Design Needed by Teachers of Vocational Horticulture in Tennessee, 1983.

Competencies	Mean Scores[a] Needed by Teachers N=35
1. List reasons for landscaping property.	4.23
2. Name climatic factors that can be controlled to conserve landscape techniques.	3.97
3. Identify the best trees for controlling solar radiation in landscaping.	3.97
4. Identify sites for evergreens to screen wind in landscaping.	3.91
5. Identify plant conditions that would prevent soil erosion in landscaping.	4.23
6. List ways that landscaping would increase property value.	4.29
7. Identify ways which plants may provide visual screening.	4.03
8. Describe ways plants can reduce noise and/or air pollution.	3.82
9. List reasons why weeds need to be controlled when raising horticultural plants.	4.17
10. Identify terms related to weeds and herbicides.	4.23
11. Describe and compare various pre-emergent weed control measures.	3.91
12. Identify common soil sterilants.	3.91
13. Identify and prescribe control practices for common weed problems.	3.94
14. Identify characteristics and examples of common landscape elements (line, form, texture, contrast, etc.)	4.14
15. Identify plants and construction materials which illustrate common landscape elements.	4.11

Table 2 Continued

	Competencies	Mean Scores[a] Needed by Teachers N-35
16.	Identify trees, shrubs, and ground covers suitable for landscaping in area to be planted.	4.49
17.	Identify and describe drafting tools.	3.74
18.	Identify each mark on a ruler.	4.14
19.	Change life-sized landscape objects to the correct size on paper using a scale of 1/4 = 1", 1/8 = 1", or 1/10 = 1".	3.89
20.	Draw graphic symbols of trees, shrubs, ground covers, and construction material to scale.	3.97
21.	Demonstrate correct lettering on landscape drawings.	3.74
22.	Map and draw a house, lot lines, and trees according to scale.	4.14
23.	Describe needs that should be considered when planning a landscape situation.	4.22
24.	Conduct a complete landscape site analysis on an area of land.	4.14
25.	Draw a plot plan to scale for an area of land.	3.91
26.	Design and draw a complete functional landscape plan for a residential area.	4.19
27.	Plant trees, shrubs, bulbs, and ground cover according to a landscape construction and maintenance plan.	4.26
28.	List questions about the requirements for self-employment in landscape construction, and maintenance.	3.91
29.	Calculate amounts and costs of horticultural materials accurately for a landscape job.	4.18
30.	Describe methods when calculating prices and profits for a landscape job.	4.18
31.	Describe and fill in a proposal and contract form correctly for a landscape job.	4.09

[a]Ratings based on a five-point scale.

FINDINGS AND RECOMMENDATIONS

The major findings of this study were:

1. All 108 competencies in greenhouse management needed by the teachers received mean ratings of 3.00 or higher. Forty-five competencies received mean rating of 4.00 or higher.

2. All 31 competencies in landscape design needed by the teachers received mean ratings of 3.00 or higher. Eighteen competencies received mean ratings of 4.00 or higher.

The following recommendations are made as a result of this study and the opinion of the researcher:

1. The 108 competencies in greenhouse management and the 31 competencies in landscape design should be incorporated into the agricultural education and horticulture programs at Tennessee Technological University.

2. Findings of this study should be used by the State Joint Staff for Agriculture Education in Tennessee to design and develop in-service teacher training programs in ornamental horticulture.

3. Techniques should be developed to measure the performance of undergraduate students in performing the technical competencies identified in this study.

4. The author feels that the following protocol should be followed by undergraduate students in agricultural and horticultural education so they may acquire a high proficiency level in these technical competencies:

   a. Follow a curriculum that includes courses which offer training in the competencies.

   b. Participate fully in laboratories offered in conjunction with courses.

   c. Participate in conferences, seminars, and student organizations.

   d. Participate in occupational experience and work study programs.

e. Attend in-service courses and workshops.

APPENDIX

TENNESSEE TECH UNIVERSITY

MEMORANDUM

TO:

FROM: Edwin E. Lamberth, Assistant Professor of Agricultural Education

DATE: February 25, 1983

RE: A STUDY OF THE TECHNICAL COMPETENCIES IN GREENHOUSE MANAGEMENT AND LANDSCAPE DESIGN OF TEACHERS OF VOCATIONAL HORTICULTURE IN TENNESSEE

I am making a study of the technical competencies in greenhouse management and landscape design needed by high school teachers of horticulture in Tennessee. The study is based on the competencies included in the Tennessee Ornamental Horticulture Curriculum Guide.

The findings from the study will be helpful in evaluating and planning teacher education programs. Also, they will be beneficial in developing in-service training activities including the annual Tennessee Tech workshop for teachers of horticultural. Would you please complete the enclosed questionnaire and return by March 15, 1983? It will take approximately 25 minutes to complete. Your responses will be treated in a confidential manner. At no time will you or your department be identified in the research report. A self-addressed, stamped envelope is enclosed for returning the questionnaire. Also enclosed is a small gift for your time and support.

Your prompt attention to this matter will be greatly appreciated.

/sls

Enclosures

Department of General Agriculture/*School of Agriculture*/*Tennessee Technological University*
Box 5095/Cookeville TN, 38501/615-528-3152 or 528-3153

TECHNICAL COMPETENCIES IN GREENHOUSE MANAGEMENT
AND LANDSCAPE DESIGN NEEDED BY TEACHERS
OF VOCATIONAL HORTICULTURE

Teachers of vocational horticulture must demonstrate competence in two major areas, technical and professional. Technical competencies would include such items as controlling greenhouse insects and developing a landscape plant. Professional competencies would include items such as planning daily lessons and ordering supplies. Most competencies are developed in the preservice and in-service training of teachers. This study deals only with the technical competencies in greenhouse management and landscape design needed by teachers of vocational horticulture.

In the right hand column, indicate by circling the proper number the degree of competence you feel necessary for teachers of vocational horticulture. Be sure to respond to each item using the scale provided.

	COMPETENCIES	Level of Competency Mastery Needed by Teachers Low High
I.	Greenhouse Management	
1.	Identify potential safety hazards in a greenhouse.	1 2 3 4 5
2.	Determine methods of eliminating safety hazards in a greenhouse	1 2 3 4 5
3.	Identify common houseplants.	1 2 3 4 5
4.	Identify common greenhouse plants.	1 2 3 4 5
5.	Identify correct soil mix for common types of crops.	1 2 3 4 5
6.	Name steps in preparing a compost pile.	1 2 3 4 5
7.	Demonstrate correct procedure in mixing soil.	1 2 3 4 5
8.	Demonstrate correct procedure in filling bins, benches, and pots.	1 2 3 4 5
9.	Prepare production schedules for common bedding plants.	1 2 3 4 5
10.	Prepare production schedules for common annual flowers.	1 2 3 4 5
11.	Identify the light and temperature requirements for common houseplants.	1 2 3 4 5

COMPETENCIES	Low				High
12. Identify the soil requirements for common houseplants.	1	2	3	4	5
13. Identify class of poinsettias and examples of each class.	1	2	3	4	5
14. Describe and diagram types and arrangements of inflorescence on a blooming poinsettia.	1	2	3	4	5
15. Identify and describe basic needs of growing poinsettias.	1	2	3	4	5
16. Determine types of fertilizer needed by poinsettias.	1	2	3	4	5
17. Calculate rates of fertilizer needed by poinsettias.	1	2	3	4	5
18. Compare advantages and disadvantages of methods in controlling the height of poinsettias.	1	2	3	4	5
19. Determine photo-period and time requirements for poinsettias.	1	2	3	4	5
20. Identify common diseases and insects attacking poinsettias.	1	2	3	4	5
21. Methods of controlling common diseases and insects on poinsettias.	1	2	3	4	5
22. Name, identify, and describe classes of chrysanthemums.	1	2	3	4	5
23. Determine photo-period and time requirements for chrysanthemums.	1	2	3	4	5
24. List propagation techniques and potting instructions for chrysanthemums.	1	2	3	4	5
25. Identify correct light and temperature requirements for chrysanthemums.	1	2	3	4	5
26. Determine correct water requirements for chrysanthemums.	1	2	3	4	5
27. Determine correct fertilizer requirements for chrysanthemums.	1	2	3	4	5
28. Describe why disbudding and pinching are important to chrysanthemym production.	1	2	3	4	5

	COMPETENCIES	Low				High
29.	Describe why growth regulators are important to chrysanthemum production	1	2	3	4	5
30.	Demonstrate correct method for moving plants from beds to plots.	1	2	3	4	5
31.	Select good stock plants for cuttings and seedlings.	1	2	3	4	5
32.	Demonstrate correct procedures of thinning, pruning, typing, and disbudding plants.	1	2	3	4	5
33.	Demonstrate correct procedure for watering plants.	1	2	3	4	5
34.	Prepare a complete production schedule for a greenhouse crop.	1	2	3	4	5
35.	Determine correct ventilation requirements for the greenhouse.	1	2	3	4	5
36.	Compare heating requirements and annual fuel costs for various size greenhouses.	1	2	3	4	5
37.	Dompare heating methods for a greenhouse	1	2	3	4	5
38.	Compare methods of cooling a greenhouse.	1	2	3	4	5
39.	Identify deficiency symptoms of the essential chemical elements.	1	2	3	4	5
40.	Describe influence of each of the essential chemical elements on plant growth.	1	2	3	4	5
41.	Determine types of fertilizers to use and when to apply on various plants.	1	2	3	4	5
42.	Determine kinds and rates of fertilizer and lime to apply on various plants.	1	2	3	4	5
43.	Calculate rates of liquid plant food to apply on various plants.	1	2	3	4	5
44.	Select proper applicators to use with liquid fertilizers.	1	2	3	4	5
45.	Identify common greenhouse insects.	1	2	3	4	5
46.	Identify major body parts and life cycle stages of insects.	1	2	3	4	5

	COMPETENCIES	Low				High
47.	Identify common greenhouse insects and the damage that each does.	1	2	3	4	5
48.	Identify common organisms and name the diseases they cause on greenhouse plants.	1	2	3	4	5
49.	Describe disease damage to plants caused by common organisms.	1	2	3	4	5
50.	Identify ways diseases are spread to plants.	1	2	3	4	5
51.	Describe the effects of light, temperature, and humidity on plant diseases.	1	2	3	4	5
52.	Identify means used in controlling common greenhouse diseases.	1	2	3	4	5
53.	Name and interpret all information found on a pesticide label.	1	2	3	4	5
54.	Identify common weeds that may be growing among greenhouse plants.	1	2	3	4	5
55.	Determine influence of weeds on plant growth and sale value.	1	2	3	4	5
56.	Select a method of controlling weeds that are growing in the greenhouse crops.	1	2	3	4	5
57.	Identify correct stage which greenhouse plants should be harvested.	1	2	3	4	5
58.	Identify grades and quality of plants according to standards.	1	2	3	4	5
59.	Correctly demonstrate procedure for packaging and labeling greenhouse plants.	1	2	3	4	5
60.	Identify and remove dead and diseased blooms and leaves on plants in storage.	1	2	3	4	5
61.	Identify proper storage conditions for flowers and materials that may be used to prolong life.	1	2	3	4	5
62.	Determine proper method and materials to use in packing flowers and rotating stock.	1	2	3	4	5
63.	Define common greenhouse terms accurately.	1	2	3	4	5
64.	Identify types of greenhouse shapes.	1	2	3	4	5

	COMPETENCIES	Low				High
65.	Define common greenhouse parts accurately.	1	2	3	4	5
66.	List advantages and disadvantages of various greenhouse building materials.	1	2	3	4	5
67.	List desirable characteristics of good greenhouse benches.	1	2	3	4	5
68.	Identify and state advantages of various greenhouse bench arrangements.	1	2	3	4	5
69.	Define common plant propagation terms.	1	2	3	4	5
70.	State reasons for sexual and asexual reproduction in propagating various kinds of plants.	1	2	3	4	5
71.	Identify sexual organs and processes of reproduction in a complete plant flower.	1	2	3	4	5
72.	Identify parts and processes in propagating plants sexually.	1	2	3	4	5
73.	Identify parts and processes in propagating plants asexually.	1	2	3	4	5
74.	Identify types and characteristics of various plant growing media.	1	2	3	4	5
75.	List requirements of media used for transplanting seedlings.	1	2	3	4	5
76.	List requirements of media used for transplanting asexually propagated materials.	1	2	3	4	5
77.	Mix ingredients for a soil mix according to specifications.	1	2	3	4	5
78.	Identify purposes for sterilizing soil.	1	2	3	4	5
79.	Identify methods of sterilizing soil.	1	2	3	4	5
80.	Identify the procedures in sterilizing soil.	1	2	3	4	5
81.	Describe environmental needs of newly propagated plant materials.	1	2	3	4	5

	COMPETENCIES	Low				High
82.	Compare types of propagating structures and equipment items.	1	2	3	4	5
83.	Label propagated materials correctly.	1	2	3	4	5
84.	Differentiate between the common types of cuttings from woody plants.	1	2	3	4	5
85.	Identify tools, equipment, and materials needed for proper handling of cuttings.	1	2	3	4	5
86.	Demonstrate proper methods for taking cuttings from woody plants.	1	2	3	4	5
87.	Identify parts of a herbaceous plant used in making cuttings.	1	2	3	4	5
88.	Make common types of cuttings from a herbaceous plant correctly.	1	2	3	4	5
89.	Define term "plant layering" correctly.	1	2	3	4	5
90.	Identify common types of layerage that can be used in propagating plants.	1	2	3	4	5
91.	Demonstrate correct time and procedures for propagating plants by layerage..	1	2	3	4	5
92.	Define separation, division, and offset in propagating plants.	1	2	3	4	5
93.	Identify specialized organs by which plants reproduce asexually.	1	2	3	4	5
94.	Separate plants correctly for propagating.	1	2	3	4	5
95.	Define terms related to grafting and budding.	1	2	3	4	5
96.	Explain uses for propagating when grafting of budding.	1	2	3	4	5
97.	Explain process involved in making the union on a completed graft.	1	2	3	4	5
98.	Demonstrate types of grafts.	1	2	3	4	5
99.	Demonstrate budding procedures.	1	2	3	4	5
100.	List practices that insure a successful graft.	1	2	3	4	5

	COMPETENCIES	Low				High
101.	Identify different vegetable seeds.	1	2	3	4	5
102.	Identify different flower seeds.	1	2	3	4	5
103.	List reliable sources of seeds, when buying.	1	2	3	4	5
104.	List factors affecting dormancy and methods of breaking dormancy of seeds.	1	2	3	4	5
105.	Name methods of testing seeds.	1	2	3	4	5
106.	Prepare, plant, and care for seed flats.	1	2	3	4	5
107.	Prepare, plant, and care for seedlings.	1	2	3	4	5
108.	List steps when transplanting seedlings.	1	2	3	4	5
II.	Landscape design					
1.	List reasons for landscaping property.	1	2	3	4	5
2.	Name climatic factors that can be controlled to conserve landscape techniques.	1	2	3	4	5
3.	Identify the best trees for controlling solar radiation in landscaping.	1	2	3	4	5
4.	Identify sites for evergreens to screen wind in landscaping.	1	2	3	4	5
5.	Identify plant conditions that would prevent soil erosion in landscaping.	1	2	3	4	5
6.	List ways that landscaping would increase property value.	1	2	3	4	5
7.	Identify ways which plants may provide visual screening.	1	2	3	4	5
8.	Describe ways plants can reduce noise and/or air pollution.	1	2	3	4	5
9.	List reasons why weeds need to be controlled when raising horticultural plants.	1	2	3	4	5
10.	Identify terms related to weeds and herbicides.	1	2	3	4	5
11.	Describe and compare various pre-emergent weed control measures.	1	2	3	4	5

	COMPETENCIES	Low				High
12.	Identify common soil sterilants.	1	2	3	4	5
13.	Identify and prescribe control practices for common weed problems.	1	2	3	4	5
14.	Identify characteristics and examples of common landscape elements (line, form, texture, contrast, etc.)	1	2	3	4	5
15.	Identify plants and construction materials which illustrate common landscape elements.	1	2	3	4	5
16.	Identify trees, shrubs, and ground cover suitable for landscaping in area to be planted.	1	2	3	4	5
17.	Identify and describe drafting tools.	1	2	3	4	5
18.	Identify each mark on a ruler.	1	2	3	4	5
19.	Change life-sized landscape objects to the correct size on paper using a scale of 1/4"=1', 1/8"=1', or 1/10"=1'.	1	2	3	4	5
20.	Draw graphic symbols of trees, shrubs, ground covers, and construction materials to scale.	1	2	3	4	5
21.	Demonstrate correct lettering on landscape drawings.	1	2	3	4	5
22.	Map and draw a house, lot lines, and trees according to scale.	1	2	3	4	5
23.	Describe needs that should be considered when planning a landscape situation.	1	2	3	4	5
24.	Conduct a complete landscape site analysis on an area of land.	1	2	3	4	5
25.	Draw a plot plan to scale for an area of land.	1	2	3	4	5
26.	Design and draw a complete functional landscape plan for a residential area.	1	2	3	4	5
27.	Plant trees, shrubs, bulbs and ground cover according to a landscape construction and maintenance plan.	1	2	3	4	5
28.	List questions about the requirements for self-employment in landscape construction and maintenance.	1	2	3	4	5

COMPETENCIES	Low				High
29. Calculate amounts and costs of horticultural materials accurately for a landscape job.	1	2	3	4	5
30. Describe methods when calculating prices and profits for a landscape job.	1	2	3	4	5
31. Describe and fill in a proposal and contract form correctly for a landscape job.	1	2	3	4	5

TO:

FROM: EDWIN E. LAMBERTH, ASSISTANT PROFESSOR OF AGRICULTURAL EDUCATION

RE: A STUDY OF TECHNICAL COMPETENCIES IN GREENHOUSE MANAGEMENT AND LANDSCAPE DESIGN OF TEACHERS OF VOCATIONAL HORTICULTURE

DATE: APRIL 4, 1983

On February 25, I mailed to you a letter and a questionnaire concerning your technical competencies in greenhouse management and landscape design. Did you complete and return the questionnaire? If so, let me express my appreciation for your time and effort.

A few teachers have not completed the questionnaire. Would you please do so and return it to me as soon as possible. Your responses are essential if the study is to be meaningful.

Your prompt attention to this request will be greatly appreciated. Thanks for your help.